Citizen's Guide to

WATER HEATERS

Part of the "How To's of Home Improvement" series

PURPOSE

This handout addresses the typical questions and general information associated with a Water Heater replacement project in a Single Family Dwelling. Due to the overwhelming variables, not all applications can be included on this handout. Please note that each type of water heating system contains it's own set of requirements and restrictions. Therefore this handout is only intended as a guide.

SCOPE

The practice of piping hot water is millennia old. Ancient Greeks and Romans enjoyed hot baths. Today, hot water use is not only a luxury, it is mandatory.

GENERAL INFORMATION

Code - 1994 Uniform Plumbing Code. Chapter 5 - Water Heaters.

Types

There are different types and sizes of water heaters. The two most common water heaters are Gas and Electric.

1. Gas - Natural Gas or Propane (LPG).
Please be cautioned, there is a difference between Natural Gas and Propane Water Heaters and they are not interchangeable.

2. Electric - 120 volt or 240 Volt.

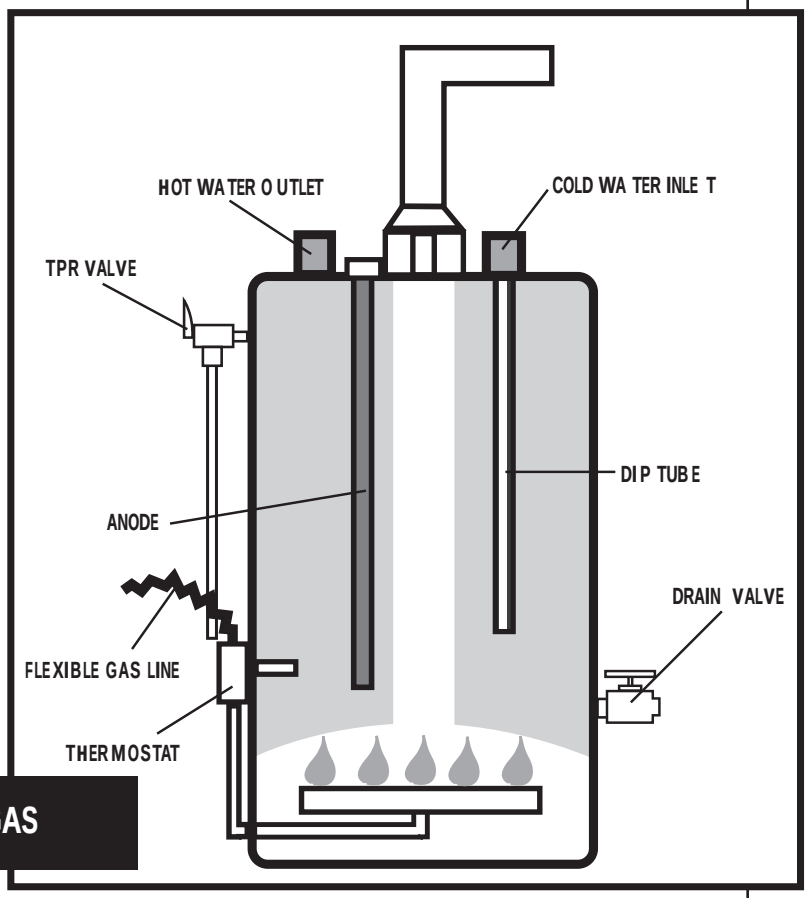
3. Instantaneous - This type can be gas or electric and is usually installed under sinks where small amounts of hot water are needed. However, Whole House Instantaneous Water heaters are available and in use.

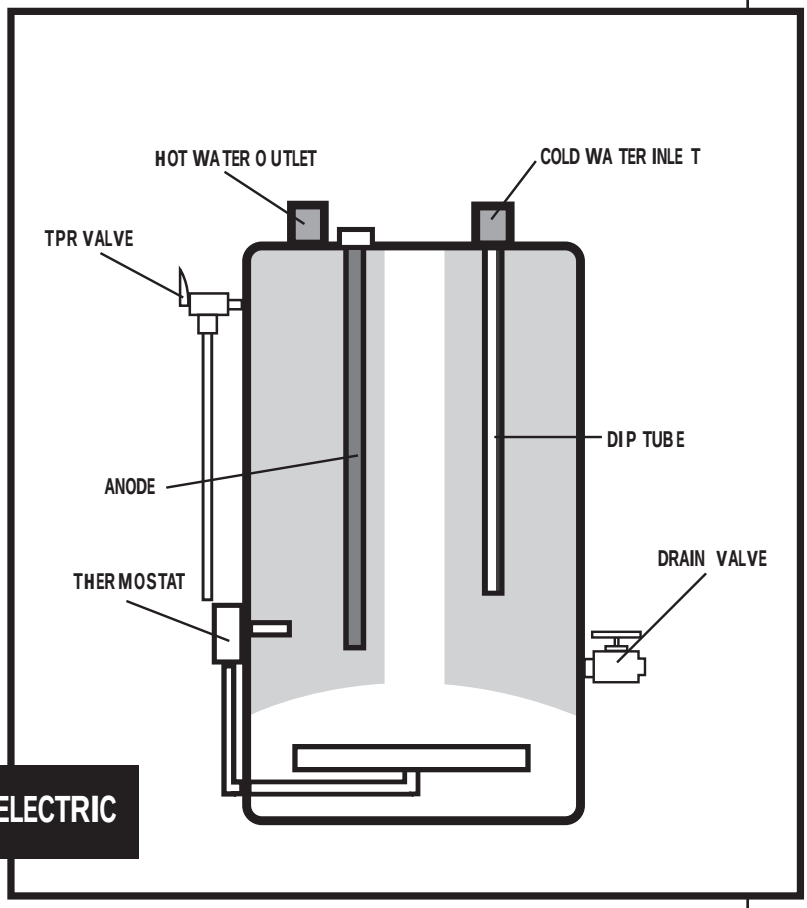
4. Solar - This is a specialized system that gained popularity in the 1970's and 1980's due to the "energy crunch" during those eras. Solar Water Heaters are sometimes used in "Green Buildings" and for heating pool water.

CAUSES OF FAILURE

Almost all components on a water heater can be fixed or replaced except for the tank. Once the tank rusts through, there is no way to repair it - replacement is the only solution. Water heaters come with internal sacrificial anode rods to protect against rusting. An anode's sole purpose is to corrode away instead of the steel tank. Replacing the anodes every 3-4 years (more frequently if water is softened) will add considerable life to a water heater at a fraction of the replacement cost.

Another main cause of failure is overheating from sediment build-up inside the tank. Request a licensed Plumbing Contractor to inspect the anodes and sediment periodically. Sometimes this can be done as part of an annual service agreement.





SAFETY

- Keep the area around a water heater clear of stored household items.
- Never, Never, Never use or store gasoline or flammable liquids in, on, or around the Water Heater. Maintain your automobiles so there are no fuel leaks.
- Never use the top of the water heater as a storage shelf.
- Follow the Manufacturer's recommended maintenance practices.
- Visually check the Water Heater at least once a month.

WATER HEATER COMPONENTS

TPR Valve

Water heaters have a TPR valve (Temperature & Pressure Relief) or T&P valve, which is a safety device that releases pressure if the pressure or the temperature reach an unsafe level. The T&P valve is usually mounted on the top of the tank or on the side of the tank

A manual release lever is located on the valve. Water Heater Manufacturers, recommend periodically testing by lifting the manual release lever. Due to the scalding potential, the TPR valve discharges are piped outside and downward to within 6 inches of the outside of the dwelling at near ground level. Check with your local building department for local building code requirements.

Anode

The sacrificial anode is a metal rod usually magnesium or aluminum which helps prevent corrosion of the metal tank. Electrolysis eats away the metal anode instead of the metal of the tank. Once the anode is gone the tank itself begins to corrode. To prolong the life of the tank, make sure your anode rod is still there, and replace it when needed.

The anode is screwed into the top of the tank and can be replaced. Sometimes the anode is built into a special outlet fitting. Softeners can cause the anode to wear out more quickly. Bacteria can react with magnesium anodes causing hydrogen sulfide which can cause a rotten egg odor. Switching to an aluminum anode rod can help eliminate the odor problems.

Dip Tube
The dip tube is a long narrow tube that directs incoming cold liquid to the bottom of the tank, preventing premature mixing of incoming cold liquid with the outgoing hot liquid at the top of the tank. Without the dip tube, or with a broken dip tube, it may seem as though you run out very quickly, or you just get a luke warm temperature.

Thermostat
The thermostat senses when the tank drops below a certain pre-set temperature and causes the burner to come on. When the desired temperature is reached, the thermostat shuts off the burner. There is a knob that allows you to set the temperature to warm medium or hot.

High limit switch (Electric Water Heater)
If the tank gets too hot it trips the high limit switch, (a circuit breaker). The high limit switch is in the top thermostat and usually has a red button. In order to get it working again the high limit switch must be manually reset by pushing in the red button.

Drain Valve
A drain valve allows periodic draining for removal of sediment, or for replacement. In areas with high mineral content it is recommended to drain at least 5 gallons from the drain valve every six months to prevent sediment build up. Plastic drain valves are most common. Be cautious not to break the valve. Replacing it with a brass ball valve will facilitate draining. A ball valve has a bigger opening making draining sediment much easier.

Water Heater Replacement

- Follow the Manufacturer's Installation instructions.
- Water heaters must be installed with clearance from combustible material in accordance with the manufacturer's installation instructions and listings.
- Water heaters installed in a garage must be elevated so the pilots, burners or heating element and switches are at least 18 inches above the floor. This requirement applies to gas and electric water heaters. Gas fired water heaters are prohibited in a bedroom, bathroom or an areas only accessible through a bedroom or bathroom. Direct vent appliances can be located in any room.
- A shut off valve is required on the cold water (inlet) side.
- Unions must be installed within 12 inches of a water heater to facilitate removal.
- A minimum 3/4 inch T&P drain line (usually hard drawn copper) must terminate outside of the building minimum 6 inches to maximum 24 inches above grade pointing downward. Contact the Building Inspector if the Water Heater is located such that a T&P line cannot be routed to the outside. T&P lines must slope to drain and not create a water trap or seal.
- Gas Water Heaters require Combustion air in accordance with UPC 507.
- Gas Water Heaters require proper Venting in accordance with UPC 512 through 520.

Common Questions

Most, if not all, of the frequently asked questions can be answered by consulting a Licensed Plumbing Contractor. Be aware that a Licensed Contractor may ask for a fee for their consulting services. A Licensed Plumbing Contractor can be located in the Phone Book or by calling the Arizona Registrar of Contractors at 602-542-1525.

Q: When should I replace my Water Heater?
A: If you notice any leaking around the Water Heater area, repair is likely necessary and may be suspect for replacement. Industry statistics show that the average water heater lasts 12 years. With regular maintenance and routine repairs, some units keep operating two or three times as long. However, it's not always advantageous to keep older units in service. Modern high-efficiency water heaters often can pay for themselves in energy savings within 3-5 years.

Q: Is it necessary to hire a Plumbing Contractor or can the homeowner replace a Water Heater?
A: A homeowner may perform the work. However, there are many caveats that discourage a novice from doing so. The first and most important is safety. CAUTION: A WATER HEATER MUST BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THE CURRENT PLUMBING CODE. Working with gas or electricity can be dangerous and lethal even for the experienced, but especially for the inexperienced. Also, a Licensed Plumbing Contractor is required by State Law to

Q: Can I wrap my Water Heater with an insulating blanket?

A: Consult the manufacturer's installation instructions and warning labels affixed to the Water Heater. Because of stricter energy conservation laws, Water Heaters are manufactured with insulation around the tank. Additional insulation may void the warranty and/or cause damage.

Q: What temperature setting is best?

A: Most automatic dishwashers operate at 140 degrees F. However, It is universally recommended to keep the water temperature at bathtubs and showers at no more than 125 degrees F to prevent scalding, especially children and those with sensitive skin. New homes are required to have temperature limiting valves installed at tubs and showers to help avoid scalding, but children should never be left unattended around any water receptor. Consult the information affixed to the Water Heater and the Manufacturer's Installation Instructions for the proper settings.

Q: Which is better, a Gas Water Heater or an Electric Water Heater?

A: Gas water heaters are the most desired type. A Gas Water Heater heats the tank to operating temperature about twice as fast as and Electrical Water Heater does and costs less than half what it takes for an electric unit.

Q: Do I need a Permit?

A: A permit is required for Water Heater replacement. A permit may be obtained by the homeowner or a licensed contractor. The owner of the property is ultimately responsible for insuring that a permit is obtained and the inspection card is on site at a readily visible location (i.e. near the Water Heater). A Permit may be obtained at the One Stop Shop located on the first floor at 7447 E. Indian School Road.

Inspection requirements

The Inspection Card lists in detail the required inspections. The following inspections are for information and may vary depending upon the installation.

WATER HEATER INSPECTION

Your new water heater has been inspected and approved.
This is what was checked during the inspection.

Electric Water Heater: Permit:		Proper grounding and bonding connections
		Proper electrical wiring ove current and connections
		New temperature and pressure relief valve
		Reconnection of temperature and pressure relief drain
		Reconnection of hot and cold water lines to water heater
		Proper vertical and horizontal clearances
Gas Water Heater: Permit:		Approved gas valve
		Approved flexible connector from valve to water heater
		Reconnection of vent connector to B vent
		Installation of proper vent collar on top of water heater
		New temperature & pressure relief valve
		Reconnection of temperature & pressure relief drain
		Reconnection of hot and cold water lines to water heater
		Proper vertical and horizontal clearances

Signed _____ Date _____

Phone Numbers

One Stop Shop (Building Permit)
480-312-2500

Inspection Services
480-312-5750

Automated Inspection Request Line
480-312-5796

Arizona Registrar of Contractors
602-542-1525

Web Sites

City of Scottsdale
http://www.scottsdaleaz.gov

Arizona Registrar of Contractors
http://www.rc.state.az.us/

Information Resources

There are several informational sources pertaining to Water Heaters. Listed below are a few:
City of Scottsdale Library
Licensed Plumbing Contractor
The Internet
Home Improvement Store
Specialty Books
Water Heater Manufacturer